

Wall Lake
LaGrange County
Supplemental Sunfish and Walleye Evaluation

Dates of Survey: June 1 and 28 and October 4, 2010

Biologist: Neil D. Ledet, District 2 Fisheries Biologist

Objective: The objectives of these surveys were to monitor the bluegill, redear and largemouth bass populations following the introduction of walleyes and to evaluate advanced walleye stockings in accordance with work plan 300FW1F10D42643.

Methods: During June, sampling was conducted on two nights to collect bluegills, redear and largemouth bass. Sampling consisted of one hour of electrofishing on each occasion. Fish collection effort on October 4 consisted of 1.5 hours of electrofishing. Only walleyes were collected in September and nearly the entire shoreline was covered.

All fish collected were measured to the nearest 0.1 in TL. Weights were taken from walleyes to the nearest 0.01 pound. Scale samples were taken from all four species for age and growth determination and a sub-sample of dorsal spines was taken from walleyes. All electrofishing samples were conducted at night with a pulsed D.C. electrofisher using two dip netters.

Results: During the two hours of June electrofishing, 912 bluegills, 165 largemouth bass and 62 redear were collected (Table 1). The water temperature was 80.0° F and 81.2° F on June 1 and June 28 respectively.

Bluegills were collected at a rate of 460 per electrofishing hour. The historical bluegill electrofishing catch rate at Wall Lake has ranged from 136 per hour in 2008 to 914 in 2003. In 2003, relatively large year classes of age-2 and age-3 bluegills were present. The average bluegill electrofishing catch rate from similar size natural lakes in District 2 is 148 per hour. The major change in 2010 in the bluegill size distribution was an increase in the number of bluegills less than 3.0 in TL which were collected at a rate of 106 per electrofishing hour. This catch rate

has ranged from 12 in 2007 to 174 in 2003. In 2009, 45 bluegills less than 3 in TL were collected per electrofishing hour.

Bluegills ranged in length from 1.2 to 9.2 in TL, similar to that observed in previous years. Fourteen percent of the bluegills collected by DC electrofishing were harvestable size, 6.0 in TL or larger and have ranged from 13.3% in 2003 to 44.1% in 2007 (Table 2). In 2009, 21.1% were harvestable size. The number of 8 in TL and larger bluegill also declined in 2010.

Redear ranged in length from 4.4 to 9.3 in TL and were collected at a rate of 31 per hour, similar to that observed in 2008. Electrofishing catch rates have ranged from 11 per hour in 2009 to 108 per hour in 2003. Harvestable sized redeer, 6.0 in TL or larger, comprised 79.0 percent of the 2010 sample and ranged from 76% in 1987 to 100% in 2008.

In 2010, 83 largemouth bass were collected per electrofishing hour, similar to 2009. They ranged in length from 3.3 to 15.1 in TL. Bass electrofishing catch rates have ranged from 61 in 1987 to 129 per hour in 2007. The percent of harvestable size bass, those 14 in TL or larger remains low, 0.6%. An exceptionally large percentage (19.7%) of the bass collected in 1987 was harvestable size. However, since that time the percent of harvestable fish has not exceeded 3.1%.

Based on average length at last annulus formation, bluegills, redeer and largemouth bass at Wall Lake have historically grown at rates well below average for northeast Indiana natural lakes (Table 3). One exception was the growth observed in 1987 for age-4 and age-5 bass which was average.

The Wall Lake Fisherman's Association funded walleye stockings for Wall Lake in 2005, 2006 and 2007. During these years, 1,400 advanced walleye fingerlings, (10 per acre) ranging from 5 to 8 in TL were released (Table 4). Walleye stocking did not occur in 2008 but resumed in 2009 with the Division of Fish and Wildlife assuming responsibility.

During the 2010 fall survey the water temperature was 61°F. A total of 77 walleyes ranging from 10.2 to 20.6 in TL were collected. Fifty-one age-1 walleyes were collected at a rate of 34.0 per electrofishing hour, identical to the collection rate from the initial Wall Lake stocking in 2005 (Table 5). This rate is also the highest recorded to date from any northern Indiana natural lake stocked with advanced walleyes (Table 6). These age-1 walleyes ranged from 10.2 to 13.3 inches and averaged 12.0 inches (Table 7). The historical average length of age-1 Wall Lake walleyes is similar to the averages at Clear Lake and Lake Maxinkuckee but 1 to 1.2 in TL shorter than age-1 walleyes from Pretty and Big Turkey lakes respectively (Table 8).

Age-3 walleyes collected from Wall Lake in 2010 ranged in length from 14.9 to 17.9 in TL and averaged 16.3 in TL. These fish were collected at a rate of 15.3 per electrofishing hour, which is exceptionally high for District 2 walleye lakes. This is also over three times higher than the catch rate in 2008 when this year class was age-1. During 2010, native aquatic vegetation expanded significantly in the shallows which provided more near shore habitat and likely increased vulnerability of these older walleyes to fall electrofishing.

In 2007, Pretty Lake advanced walleyes were stocked at a rate 12.4 per acre compared to 10.0 per acre in 2009, resulting in age-1 walleye electrofishing catch rates of 30.7 and 11.4 per hour respectively. The fish stocked in 2007 averaged 8.9 in TL (4.6/lb) which was 3.0 inches larger than the 5.9 in TL walleye (21.9/lb) stocked in 2009. Wall Lake in LaGrange County was also stocked in 2009 with advanced walleyes from the Fawn River State Fish Hatchery at a rate of 10.0 per acre. These fish provided a 2010 catch rate for age-1 walleyes of 34.0 per electrofishing hour. The Wall Lake walleyes averaged 8.5 in TL at stocking, again substantially larger than the 2009 Pretty Lake fish. Neither lake was stocked in 2008, so the survival of age-1 fish was not affected by a year class from the preceding year. Studies referenced by Kamp 2009 suggest that there is no difference in survival to age 1 between June stocked walleyes and advanced fish measuring 4.0 in TL and that advanced fingerlings may need to be greater than 7.0 in TL before a benefit is realized.

Summary: Although it is too early to draw any solid conclusions concerning the impacts of adding another predator fish to the population, there are some interesting observations. The percent of harvestable size bluegills collected by electrofishing increased from 13% in 2003 to 44% in 2007, 18 months following the initial Wall Lake walleye stocking. This coincided with a decline in the overall bluegill electrofishing catch rate from 914 per hour in 2003, when large year classes of age-2 and age-3 fish were present, to 217 and 136 per hour in 2007 and 2008 respectively. The catch rate for bluegills less than 3 in TL also declined from 174 per hour in 2003 to 12 per hour in 2007 and 18 per hour in 2008. However, catch rates for this size group have increased to 45 per hour in 2009 and 106 in 2010 increasing the overall bluegill catch rates to 460 per hour. These increases followed two relatively poor walleye year classes and a missed stocking in 2008. Since only 19 bluegills less than 3 in TL were collected per electrofishing hour in 1987, something other than increased predation such as weather could have impacted year class strength.

Redear catch rates also declined from 108 per electrofishing hour in 2003 to 11 per hour in 2009. The percent of harvestable size redear collected has fluctuated between 76% and 100%. Overall, bluegill and redear continue to grow at a below average rate. However, growth has continued to improve since 2007 and for the first time, bluegill and redear growth for age 4 and 5 fish is average.

Studies on the population biology of bluegill have demonstrated that the species has high reproductive potential, density dependent growth and density independent mortality after about age 2. Consequently, bluegills often produce a large year class, and unless drastically reduced by mortality before age 2, the large year class will persist for up to six years in a stunted condition (Schneider 1996).

Like yellow perch, walleyes feed at cold temperatures and could conceivably eat many age-0 and age-1 bluegills during the winter months. However, during Schneider's 1992-93 pond experiment, it was estimated that each age-1 walleye consumed one or two age-1 bluegills compared to 45-60 age-0 bluegills over the 100 day period.

The June largemouth bass catch rates at Wall Lake have ranged from 61 per hour in 1987 to 129 per hour in 2007 and declined to 83 per hour in 2010. The percent of harvestable size bass declined from an exceptionally high 19.7% in 1987 to less than 1.0% in 2010 in spite of imposition of a 12 inch minimum size limit in 1992 which increased to 14 inches in 1998. Although there appears to be an abundant panfish forage base in Wall Lake, bass growth rates remain below average for northern Indiana natural lakes for reason other than predator-prey dynamics. While unusual, this is not unheard of. Michigan fisheries biologists have documented slow bass growth on several southern Michigan lakes. In Clear Lake, St. Joseph County Michigan, they state the reasons for the poor growth of largemouth bass in this system are not known. The lake does not have an abnormally high predator-prey ratio, and forage does not appear to be scarce. Slow growth of largemouth bass is not unique to Clear Lake. Growth of largemouth bass in nearby Corey and Pleasant lakes is similar, and bass growth in Long Lake is even slower than in Clear Lake, (Gunderman 2009).

Literature Cited:

Gunderman. Brian 2009. Clear Lake, St. Joseph County. Michigan Department of Natural Resources and Environment, Lansing, Michigan 22 pages

Kamp, Jeffrey M. and Gene R. Hatzenbeler 2009. Survival and growth of walleye fingerlings stocked at two sizes in 24 Wisconsin Lakes. North American Journal of Fisheries Management, pages 966-1000.

Schneider. James C and James E. Breck 1997. Overwinter consumption of bluegills by walleye and yellow perch. Michigan Department of Natural Resources, Fisheries Division, Research Report Number 1992. Lansing, Michigan 31 pages.

Recommendations:

1. The DFW should pursue the production of seven inch advanced fall walleye fingerlings for stocking as addressed in previous Walleye Management Committee reports.
2. The DFW should continue to annually stock advanced walleye into Wall Lake at a rate of 10 per acre.
3. During the next opportunity for rule changes, the minimum walleye size limit at Wall Lake should be increased to 16 inches and the daily bag limit reduced to two.
4. The DFW should continue to evaluate survival of fall stocked walleyes following each stocking and continue the Wall Lake bluegill/walleye work plan.

Submitted by: Neil D. Ledet, Fisheries Biologist

Date: 2/9/11

Approved by: Stu Shipman, North Region Fisheries Supervisor

Date: 2/14/11

Table 1. Number and size of bluegill, redear and largemouth bass collected from Wall Lake during nighttime DC electrofishing 1987, 2003 and 2007 through 2010

Species	1987	2003	2007	2008	2009	2010
Bluegill	286 (286/hr)	457 (914/hr)	186 (217/hr)	136 (136/hr)	317 (159/hr)	921 (460/hr)
<3"	19/hr	174/hr	12/hr	18/hr	45/hr	106/hr
Percent harvestable	23.1	13.3	44.1	17.6	21.1	14.0
Redear	29 (29/hr)	54 (108/hr)	47 (63/hr)	32 (32/hr)	22 (11/hr)	62 (31/hr)
<3"	0	0	0	0	0	0
Percent harvestable	75.9	85.2	97.9	100	86.3	79.0
Largemouth bass	61 (61/hr)	87 (87/hr)	97 (129/hr)	114 (114/hr)	163 (82/hr)	165 (83/hr)
Percent harvestable	19.7	2.3	3.1	0.9	1.8	0.60
Electrofishing hours	1 DC	1 DC	.75 DC	1 DC	2 DC	2 DC
Bluegill						
3-5.5 inch	198 (75.0%)	309 (83.5%)	83 (56.1%)	94 (79.7%)	161 (70.6%)	580 (62.9%)
6-6.5 inch	58 (22.0%)	27 (7.3%)	29 (19.6%)	12 (10.2%)	21 (9.2%)	69 (7.5%)
7-7.5 inch	8 (3.0%)	32 (8.7%)	20 (13.5 %)	11 (9.3%)	15 (6.6%)	51 (5.5%)
≥ 8 inch	0	2 (0.5%)	16 (10.1%)	1 (0.8%)	31 (13.6%)	9 (1.0)
Total	267	370	148	118	228	709
PSD	24.7	16.5	43.9	20.3	29.4	18.2
RSD 8"	0	0.5	10.8	0.8	46.2	1.0
Redear						
3-5.5 inch	5 (17.2%)	8 (14.8%)	4 (8.5%)	0	3 (13.6%)	13 (20.9)
6-6.5 inch	10 (34.5%)	29 (53.7%)	6 (12.8%)	3 (9.4%)	0	28 (45.2)
7-7.5 inch	12 (41.4%)	14 (25.9%)	28 (59.6)	12 (37.5%)	3 (13.6%)	9 (14.5)
≥ 8 inch	2 (6.9%)	3 (5.6%)	9 (19.1%)	17 (53.1%)	16 (72.7%)	12 (19.4)
Total	29	54	47	32	22	62
PSD	82.8	85.2	91.5	100	86.4	79.0
RSD 8"	6.9	5.6	19.2	53.1	72.7	19.4

Table 1 continued.

Species	1987	2003	2007	2008	2009	2010
Largemouth bass						
8-9.5 inch	29 (56.9%)	25 (39.1%)	27 (32.1%)	41 (36.9%)	33 (25.0%)	20 (12.1%)
10-11.5 inch	5 (9.8%)	24 (37.5%)	43 (51.2%)	55 (49.6%)	86 (65.2%)	76 (40.1%)
12-13.5 inch	5 (9.8%)	13 (20.3%)	11 (13.1%)	14 (12.6%)	11 (8.3%)	15 (9.1%)
14-17.5 inch	12 (23.5%)	2 (3.1%)	2 (2.4%)	1 (0.9%)	2 (1.5%)	1 (0.6%)
≥ 18 inch	0	0	1 (1.2%)	0	0	0
Total	51	64	84	111	132	112
PSD	33.3	23.4	16.7	13.5	9.8	0.89
RSD 14"	23.5	3.1	3.6	0.9	1.5	0

Table 2. Percent of harvestable size bluegill, redear and largemouth bass collected from Wall Lake in 1969, 1987, 2003 and 2007 through 2010.

Year	Bluegill		Redear		Largemouth bass	
	All gear	DC elect	All gear	DC elect	All gear	DC elect
1969	7.5	N/A	23.0	N/A	10.0	N/A
1987	30.0	23.1	70.0	75.9	20.0	19.7
2003	20.0	13.3	53.0	85.2	3.0	2.3
2007	47.2	44.1	85.9	97.9	2.9	3.1
2008	17.6	17.6	100	100	0.9	0.9
2009	28.7	21.1	87.9	86.4	1.2	1.2
2010	14.0	14.0	79.0	79.0	0.6	0.6

Table 3. Average length at last annulus formation for bluegill, redear and largemouth bass collected with all gear types during the 1969, 1987, 2003, 2007 and 2008 fisheries surveys of Wall Lake.

Bluegill	Length (inches) at last annulus formation at each age							
Survey Year	1	2	3	4	5	6	7	8
1969	1.4	2.3	3.1	4.9	5.8			
1987			3.1	4.2	5.8	6.0		
2003		2.0	2.8	3.5	4.6	5.9	6.6	6.9
2007	1.8	2.2	2.8	3.9	4.7	6.3	6.9	7.4
2008		2.4	3.1	4.6	5.7	6.7	7.5*	7.2*
2009	1.8	2.4	3.6	5.1	5.8*	7.2	7.7	8.2*
2010		3.0	4.0	5.3	6.9	7.5	7.8	
Natural Lakes Average	1.7	3.1	4.7	6.1	6.9	7.4		

Note: Relatively few bluegills were aged in 1969 and zero intercept was used. *Only one or two fish aged.

Redear	Length (inches) at last annulus formation at each age							
Survey Year	1	2	3	4	5	6	7	8
1969			3.2	4.5	5.4	6.3		
1987			3.8	4.9	6.1	6.9		
2003			3.4	4.6	5.5	6.2	6.8	7.9
2007			4.2	4.3	5.8	7.0	7.2	8.4
2008				5.5	6.2	7.4	7.9	7.9
2009		3.4		6.2	6.8	7.9	8.2	8.5
2010			5.3	5.9	7.6	8.5		
Natural Lakes Average	2.2	3.4	4.7	6.2	7.4	6.8		

Largemouth bass	Length (inches) at last annulus formation at each age							
Survey Year	1	2	3	4	5	6	7	8
1969			6.5	9.0				
1987		5.7	8.3	11.6	13.5	15.0		
2003	3.9	6.1	8.0	9.8	11.4	12.4		
2008		6.5	8.7	10.4	11.4	13.0*	14.4*	
2009	2.8	7.1	8.5	9.9	11.8	12.8	14.0	15.2
2010		5.8	7.8	9.8	11.2	12.7		
Natural Lakes Average	3.5	6.9	9.5	11.6	13.4	14.7		

*Only one or two fish aged.

Table 4. Wall Lake Walleye Stockings 2005 through 2009.

Date Stocked	# Stocked	Size (inches)
10/15/05	1,400	5-7
10/3/06	1,400	5-8
10/17/07	1,400	6-8
2008	None	
10/08/09	1,410	7.4 – 9.6 (8.5 ave)

Note: 2005-07 fish were purchased by the Wall Lake Fisherman's Association.

Table 5. Fall nighttime DC electrofishing catch rates by age for advanced walleyes collected from Wall Lake, LaGrange County 2005 through 2010.

Date Stocked	Number Stocked	Fall Sampled	EF Effort (hours)	Number of Age-1 / hour	Number of Age-2 / hour	Number of Age-3 / hour
10/11/05	1,400	2006	1.5	34.0	0	NP
10/03/06	1,400	2007	1.5	6.7	8.7	NP
10/17/07	1,400	2008	1.5	4.7	6.0	0
2008	None	2009	2.0	NP	5.5	10.5
10/08/09	1,410	2010	1.5	34.0	NP	15.3

NP: not present

Table 6. Number of age-1 advanced fall stocked walleyes collected per nighttime DC electrofishing hour at Big Turkey, Crooked, Little Turkey, Pretty, Simonton, Sylvan, Wall and Winona lakes, 2001 through 2010.

Lake	Date Stocked	# Stocked	# Stocked Per Acre	Average Size or range (Inches)	# of Age 1 Walleye Collect Per Electrofishing Hour	Year Sampled
Big Turkey (450 ac)						
	10/20/02	2,000	4.4	5-7	0.5	2003
	11/01/03	2,100	4.7	5-8	3.5	2004
	10/11/04	2,030	4.5	6-8	5.3	2005
	10/16/05	2,030	4.5	6-8	6.8	2006
	10/15/06	2,025	4.5	6-9	1.0	2007
	10/14/09	2,250	5.0	6-8	6.0	2010
Average #/hr					3.4	
Crooked (802 ac)						
	9/25/01	7,860	9.8	7.6	16.5	2002
	9/27/02	8,080	10.1	6.9	9.5	2003
	10/03/03	7,881	9.8	6.8	7.0	2004
	10/06/04	8,020	10.0	6.5	15.9	2005
	10/04/05	8,020	10.0	6.5	7.4	2006
	9/28/06	8,070	10.1	6.9	12.9	2007
	10/09/09	8,020	10.0	6-8	9.8	2010
Average #/hr					11.5	
L. Turkey (135 ac)	10/17/07	1,225	9.1	6-8	1.0	2008
	10/15/08	1,000	7.4	6-8	1.5	2009
	10/14/09	500	3.7	6-8	6.0	2010
Average # /hr					3.6	
Pretty Lake (184 ac)	10/07/07	2,280	12.4	8.9	30.7	2008
	10/08/09	1,840	10.0	5.9	11.3	2010
Average # /hr					21.0	

Table 6 continued

Simonton (299 ac)						
	10/24/00	2,000	6.7	5-8	8.5	2001
	10/11/01	2,000	6.7	5-8	3.2	2002
	10/01/02	2,200	7.4	5-8	5.7	2003
	10/21/03	2,000	6.7	5-8	2.4	2004
	10/11/04	2,000	6.7	5-8	8.1	2005
	10/10/05	1,500	5.0	5-8	9.4	2006
	10/4/06	1,220	4.1	6-8	2.1	2007
Average #/hr					5.6	
Sylvan (669 ac)						
	9/25 & 10/03/01	12,620	18.9	6.3	24.3	2002
	10/10 & 10/16/02	13,380	20.0	6.0	13.7	2003
	10/08 & 10/24/03	13,200	19.3	6.0	14.3	2004
	10/08 & 10/12/04	13,380	20.0	7.2	16.1	2005
	10/06 & 10/11/05	13,380	20.0	6.8	34.9	2006
	9/29 & 10/3/06	13,380	20.0	6.7	27.0	2007
	10/08/09	10,035	15.0	6-9	14.3	2010
Average #/hr					20.7	
Wall (141 ac)						
	10/11/5	1,400	10	5-7	34.0	2006
	10/3/06	1,400	10	5-8	6.7	2007
	10/17/07	1,400	10	6-8	4.7	2008
	2008	None				
	10/08/09	1,410	10	8.5	34.0	2010
Average #/hr					19.8	
Winona (562 ac)						
	9/27/01	10,740	19.1	6.6	9.9	2002
	10/02 & 10/16/02	11,240	20.0	6.3	15.7	2003
	10/01 & 10/03/03	11,300	20.1	7.5	25.4	2004
	10/01 & 10/12/04	11,240	20.0	6.4	1.8	2005
	10/07 & 10/11/05	11,240	20.0	7.3	4.6	2006
	9/26 & 10/3/06	11,240	20.0	7.0	12.0	2007
	10/07/09	8,430	15.0	6-9	17.7	2010
Average #/hr					12.4	

Table 7. Number, length and weight for age-1 through 3 walleyes collected during fall nighttime D.C. electrofishing from Wall Lake, 2006, 2007, 2008 and 2010.

<u>Year</u>	<u>Age 1</u>					<u>Age 2</u>					<u>Age 3</u>				
	<u>Number Collected</u>	<u>Length Range</u>	<u>Average Length</u>	<u>Weight Range</u>	<u>Average Weight</u>	<u>Number Collected</u>	<u>Length Range</u>	<u>Average Length</u>	<u>Weight Range</u>	<u>Average Weight</u>	<u>Number Collected</u>	<u>Length Range</u>	<u>Average Length</u>	<u>Weight Range</u>	<u>Average Weight</u>
2006	51	10.3 - 13.6	11.7	0.21 - 0.69	0.43	NP					NP				
2007	10	10.4 - 12.4	11.4	0.31 - 0.54	0.43	13	13.2 - 15.8	14.4	0.80 - 1.26	0.97	NP				
2008	7	9.9 —12.5	11.1	0.28 - 0.60	0.40	9	13.5 - 15.8	14.4	0.77 - 1.10	0.89	0				
2009	NP					11	13.2 - 15.6	13.2	0.71 - 1.23	0.84	21	13.9 – 17.2	15.9	0.71 – 1.60	1.28
2010	51	10.2 - 13.3	12.0	0.29 —0.72	0.51	NP					23	14.9 – 17.8	16.2	1.09 – 1.63	1.26
Total	119	9.9 —13.6	11.8	0.21 - 0.69	0.43	33	13.2 - 15.8	14.0	0.77 - 1.26	0.91	44	13.9 – 17.8	16.1	0.71 – 1.63	1.27

NP: none present

Table 8. Historical average lengths for age-1 and age-2 walleye collected during fall nighttime D.C. electrofishing from Big Turkey, Clear, Maxinkuckee, Pretty and Wall lakes.

Lake	Age 1		Age 2	
	Number	Average Length	Number	Average Length
Big Turkey	80	12.8	27	15.9
Clear	237	11.7	49	15.3
Maxinkuckee	190	11.9	73	14.7
Pretty	130	12.4	61	15.2*
Wall	119	12.0	33	14.0

*Average was 16.1 in TL prior to the 2009 sample of 28 age-2 walleyes.

Appendix 1. Species and relative abundance of fish collected from Wall Lake using trap nets, gill nets and nighttime DC electrofishing during fish community surveys in June of 1969, 1987, 2003, 2007, 2008 and 2009.

	1969	1987	2003	2007	2009
Bluegill	493	709	547	195	212
Redear	58	420	248	71	58
Largemouth bass	29	67	98	105	86
Brown bullhead	29	74	38	40	35
Yellow bullhead	52	49	13	53	29
Yellow perch	128	69	13	22	57
Hybrid sunfish	0	49	0	0	
Warmouth	9	47	15	8	11
Pumpkinseed	9	28	2	0	
Black crappie	0	26	17	1	
Golden shiner	8	13	0	0	
Redfin pickerel	0	14	2	1	
Lake chubsucker	57	7	0	0	
Bowfin	8	3	1	3	
Northern pike	6	2	9	1	1
Green sunfish	0	2	9	3	4
Carp	1	0	0	0	
Spotted gar	0	0	7	9	20
Rock bass	0	0	3	8	14
Walleye*	0	0	0	24	29
Electrofishing hours	2 AC	1 DC	1 DC**	0.75 DC	1 DC
Gill net lifts	8	6	6	4	6
Trap net lifts	4	3	3	4	3

*Walleye were initially stocked into Wall Lake during the fall of 2005

**In 2003, all fish were collected during the first 30 minutes of electrofishing while bass were collected during the entire 60 minutes of sampling.